

CLAIMS

What is claimed is:

1. A method for accessing a device, comprising:
- 2 sending a resource access request to a device driver or OPROM
  - 3 for the device;
  - 4 sending an resource access command corresponding to the device
  - 5 access request from the device driver or OPROM to an abstraction layer
  - 6 interface;
  - 7 verifying whether a resource operation corresponding to the
  - 8 resource access command is authorized to be performed on the device;
  - 9 determining a resource access method(s) that may be implemented
  - 10 to cause the device to perform the resource operation; and
  - 11 calling the resource access method(s) to perform the resource
  - 12 operation on the device.
2. The method of claim 1, wherein the resource access request
- 2 comprises requesting data to be read from the device, further comprising
  - 3 returning data read from the device to the device driver or OPROM.
3. The method of claim 1, wherein the abstraction layer interface
- 2 includes a database from which resource access methods corresponding
  - 3 to the device can be determined.

1           4. The method of claim 1, wherein the abstraction layer interface  
2 includes a database containing data corresponding to a configuration of a  
3 root bus to which the device is directly or indirectly connected to and  
4 resource information corresponding to any devices in a hierarchy of the  
5 root bus.

1           5. The method of claim 4, wherein the data corresponding to the  
2 root bus configuration and resources is represented by an object-oriented  
3 abstraction comprising a set of components that includes reference to one  
4 or more methods that may be implemented to obtain and/or generate  
5 configuration and resource allocation information for the root bus and any  
6 devices and subordinate buses in the root bus hierarchy.

1           6. The method of claim 1, wherein the abstraction layer interface  
2 hides resource access methods for the device from the device driver or  
3 OPROM so that the device driver or OPROM may not directly access the  
4 device with those access methods.

1           7. A method for providing access to devices in a system that  
2 includes a plurality of root buses, comprising:

3 storing configuration and resource information corresponding to  
4 each of said plurality of root buses and any devices and subordinate  
5 buses in a hierarchy for that root bus;  
6 providing an abstraction layer interface that enables device drivers  
7 and/or OPROMs for the devices to perform resource operations on the  
8 devices through resource access methods corresponding to those  
9 devices, said abstraction layer hiding such resource access methods from  
10 the device drivers and/or OPROMs so as to prevent the device drivers  
11 and/or OPROMs from directly implementing the resource access methods  
12 to perform resource operations on their corresponding devices;  
13 passing identification information and one or more resource access  
14 commands from a device driver or OPROM to the abstraction layer  
15 interface;  
16 verifying whether a resource operation to be performed on a device  
17 corresponding to said one or more resource access commands is  
18 authorized based on the identification information and the configuration  
19 and resource information that is stored; and  
20 performing the resource operation on the device if it is authorized  
21 to be performed.

1 8. The method of claim 7, wherein the configuration and resource  
2 information for each root bus is represented as an object-oriented  
3 abstraction comprising a set of components that includes reference to one

4 or more methods that may be implemented to obtain and/or generate  
5 configuration and resource information for the root bus and any devices  
6 and subordinate buses in the root bus hierarchy.

1 9. The method of claim 8, wherein the object-oriented abstractions  
2 for the root buses are stored in a database that is accessible by the  
3 abstraction layer interface.

1 10. The method of claim 9, further comprising providing a record  
2 for each device in the database identifying the device, a device driver or  
3 OPRM for the device, and the object-oriented abstraction corresponding  
4 to the root bus for the device.

1 11. The method of claim 7, further comprising publishing a public  
2 interface method that enables device drivers or OPRMs to access  
3 devices via the abstraction layer interface by passing identification,  
4 resource, and resource access command(s) to the abstraction interface.

1 12. An article of manufacture comprising a computer-readable  
2 medium having computer-executable instructions that when executed  
3 enable access to a device by performing the functions of:

4 sending a resource access request to a device driver or OPRM  
5 for the device;

6            sending an resource access command corresponding to the  
7            resource access request from the driver to an abstraction layer interface;  
8            verifying whether a resource operation corresponding to the  
9            resource access command is authorized to be performed on the device;  
10           determining a resource access method(s) that may be implemented  
11           to cause the device to perform the resource operation; and  
12           calling the resource access method(s) to perform the resource  
13           operation on the device

1           13. The article of manufacture of claim 12, wherein the resource  
2           access request comprises requesting data to be read from the device, and  
3           wherein execution of the instructions further performs the function of  
4           returning data read from the device to the device driver or OPROM.

1           14. The article of manufacture of claim 12, wherein execution of  
2           the instructions further performs the function of creating a database  
3           containing data corresponding to a configuration of a root bus to which the  
4           device is directly or indirectly connected to and resource information  
5           corresponding to any devices in a hierarchy of the root bus.

1           15. The article of manufacture of claim 9, wherein the data  
2           corresponding to the root bus configuration and resources is represented  
3           by an object-oriented abstraction comprising a set of components that

4 includes reference to one or more methods that may be implemented to  
5 obtain and/or generate configuration and resource allocation information  
6 for the root bus and any devices and subordinate buses in the root bus  
7 hierarchy.

1 16. The article of manufacture of claim 12, wherein the abstraction  
2 layer interface hides resource access methods for the device from the  
3 device driver or OPRM so that the device driver or OPRM may not  
4 directly access the device with those access methods.

1 17. An article of manufacture comprising a computer-readable  
2 medium having computer-executable instructions that when executed  
3 provide access to devices in a system that includes a plurality of root  
4 buses by performing the functions of:  
5 storing configuration and resource information corresponding to  
6 each of said plurality of root buses and any devices and subordinate  
7 buses in a hierarchy for that root bus;  
8 providing an abstraction layer interface that enables device drivers  
9 and/or OPRMs for the devices to perform resource operations on the  
10 devices through resource access methods corresponding to those  
11 devices, said abstraction layer hiding such resource access methods from  
12 the device drivers and/or OPRMs so as to prevent the device drivers

13 and/or OPROMs from directly implementing the resource access methods  
14 to perform resource operations on their corresponding devices;  
15 passing identification information and one or more resource access  
16 commands from the device drivers and/or OPROMs to the abstraction  
17 layer interface;  
18 verifying whether a resource operation(s) to be performed on a  
19 device corresponding to said one or more resource access commands is  
20 authorized based on the identification information and the configuration  
21 and resource information that is stored; and  
22 performing the resource operation on the device if it is authorized  
23 to be performed.

1 18. The article of manufacture of claim 17, wherein the  
2 configuration and resource information for each root bus is represented as  
3 an object-oriented abstraction comprising a set of components that  
4 includes reference to one or more methods that may be implemented to  
5 obtain and/or generate configuration and resource information for the root  
6 bus and any devices and subordinate buses in the root bus hierarchy.

1 19. The article of manufacture of claim 18, wherein the object-  
2 oriented abstractions for the root buses are stored in a database that is  
3 accessible by the abstraction layer interface, and execution of the  
4 instructions further performs the function of providing a record for each

5 device in the database identifying the device, a device driver or OPROM  
6 for the device, and the object-oriented abstraction corresponding to the  
7 root bus for the device.

1 20. A computer system comprising:  
2 a memory in which a plurality of instructions are stored;  
3 a device;  
4 a root bus to which the device is operatively coupled; and  
5 a processor connected to the root bus and the memory, said  
6 plurality of instructions when executed by the processor causing functions  
7 to be performed including:  
8 sending a resource access request to a device driver or OPROM  
9 for the device;  
10 sending an resource access command corresponding to the  
11 resource access command from the device driver or OPROM to an  
12 abstraction layer interface;  
13 verifying whether a resource operation corresponding to the  
14 resource access command is authorized to be performed on the device;  
15 determining a resource access method(s) that may be implemented  
16 to cause the device to perform the resource operation; and  
17 calling the resource access method(s) to perform the resource  
18 operation on the device.



1           21. The system of claim 20, wherein the resource access request  
2 comprises requesting data to be read from the device, and wherein  
3 execution of the instructions further performs the function of returning data  
4 read from the device to the device driver or OPROM.

1           22. The system of claim 20, wherein execution of the instructions  
2 further performs the function of creating a database containing data  
3 corresponding to a configuration of a root bus to which the device is  
4 directly or indirectly connected to and resource information corresponding  
5 to any devices in a hierarchy of the root bus.

1           23. The system of claim 20, wherein the data corresponding to the  
2 root bus configuration and resources is represented by an object-oriented  
3 abstraction comprising a set of components that includes reference to one  
4 or more methods that may be implemented to obtain and/or generate  
5 configuration and resource allocation information for the root bus and any  
6 devices and subordinate buses in the root bus hierarchy.

1           24. The system of claim 20, wherein the abstraction layer interface  
2 hides resource access methods for the device from the device driver or  
3 OPROM so that the device driver or OPROM may not directly access the  
4 device with those access methods.

1        25. A computer system comprising:  
2        a memory in which a plurality of instructions are stored;  
3        a plurality of root buses;  
4        a plurality of devices connected to the root buses; and  
5        a processor connected to the root buses and the memory, said  
6 plurality of instructions when executed by the processor causing functions  
7 to be performed including:  
8        storing configuration and resource information corresponding to  
9 each of said plurality of root buses and any devices and subordinate  
10 buses in a hierarchy for that root bus;  
11        providing an abstraction layer interface that enables device drivers  
12 and/or OPRoms for the devices to perform resource operations on the  
13 devices through resource access methods corresponding to those  
14 devices, said abstraction layer hiding such resource access methods from  
15 the device drivers and/or OPRoms so as to prevent the device drivers  
16 and/or OPRoms from directly implementing the resource access methods  
17 to perform resource operations on their corresponding devices;  
18        passing identification information and resource access command(s)  
19 from device drivers and/or OPRoms to the abstraction layer interface;  
20        verifying whether a resource operation to be performed on a device  
21 corresponding to the resource access command(s) is authorized based on  
22 the identification information and the configuration and resource  
23 information that is stored; and

24 performing the resource operation on the device if it is authorized  
25 to be performed.

1 26. The system of claim 25, wherein the configuration and  
2 resource information for each root bus is represented as an object-  
3 oriented abstraction comprising a set of components that includes  
4 reference to one or more methods that may be implemented to obtain  
5 and/or generate configuration and resource information for the root bus  
6 and any devices and subordinate buses in the root bus hierarchy.

1 27. The system of claim 26, wherein the object-oriented  
2 abstractions for the root buses are stored in a database that is accessible  
3 by the abstraction interface layer, and execution of the instructions further  
4 performs the function of providing a record for each device in the  
5 database identifying the device, a device driver or OPROM for the device,  
6 and the object-oriented abstraction corresponding to the root bus for the  
7 device.